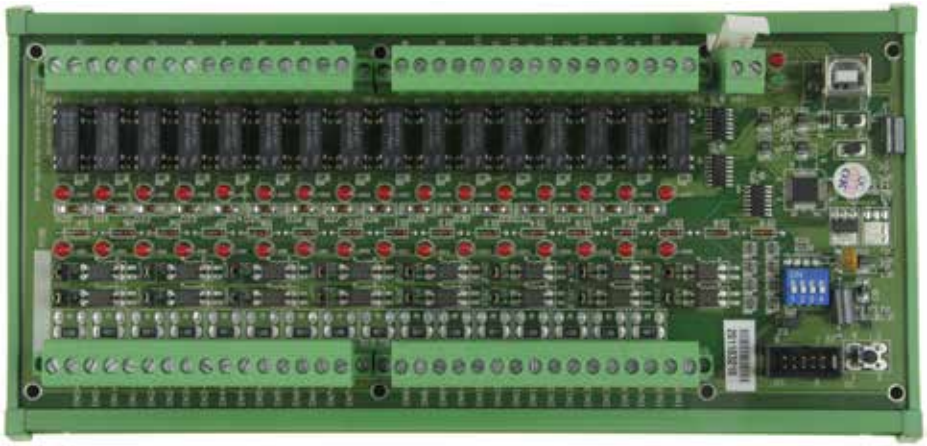
USB-I/O Manual



UHRO-16 - DIN-Rail-Version

UPRO-16 - Board-Version

16 photo couple input / 16 relay output channels

Product Code: AUSB16P/R USB 16 PHOTO ISO./ RELAY BOARD

MERZ DECISION-COMPUTER
PC-Zubehör für Industrie - Labor - Automation seit 1986

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DECISION

Data

Product Code:
AUSB16P/R USB 16 PHOTO ISO./ RELAY BOARD
UHRO-16 - DIN-Rail-version
UPRO-16 - Board-version

Bus: USB 2.0

Description:
16 photo couple input / 16 relay output channels

Input maximum load voltage is 30V

By jumper, you can select two range of voltage
0 - 4.5V off and 6V - 20V on. (0 - 20V)
0 - 16.5V off and 18 - 30V on (0 - 30V)

PC817 photo couple chips.
5000V isolation voltage.
16 Relays - 1 x COM/NO

Max switching current: 500mA
Max contact rating for relay: 100V DC

32 LED correspond to I/O ports activation status
Connections via Pluggable Screw Terminals

Features:
For direct DIN-Rail mounting
Also as board without DIN Rail adapter available

High Speed 8051 µC Core
USB 2.0 Function Controller
Support USB ID 0~14 SET

POWER External DC+5V 0,5A (max. 5.2V) - Best is to use 5V/>1A

Software/Driver:

Windows-XP Vista will use HID-interface and sample for programming, Linux driver and sample for programming.

Package includes the following items:

USB 16PR Board
USB cable
Software and Manual CD
The DIN-Rail-version comes with a EMI-Protection-kit
This kit is optional in the board-version!

Operating temperature range: 0 ~ 55C.
Relative humidity rage: 0 ~ 90%.
Size: 250 mm x 120 mm x 55 mm

Security Note

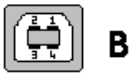
This device should not be used in applications where failure may result in death or injury without proper consideration and design of associated system architecture and redundant safety features. Connection and repairs are allowed only by a specialist.

When used in a machine or plant, is to ensure that after installation continues to the relevant provisions, rules and guidelines are complied with!

These products come into contact voltage, therefore to consider the applicable VDE regulations VDE 0550 / 0551, VDE 0700, VDE 0711, especially VDE 0100 and VDE 0860.

J1 USB Connection USB-B
A suitable cable is included

VCC	+5 VDC (USB VBUS POWER)
D-	Data -
D+	Data +
SGND	Signal Ground



USB wiring is very sensitive against EMI errors (mainly sparking when opening contacts). The U-EMI-1 Kit is included with the DIN rail version and includes two Würth folded cores for the USB data cable and a Ferrite sleeve for the power cable. If you are using a HUB, it should be protected the connection HUB/computer (U-EMI-2)! The kit includes two Würth folded cores for the USB data cable.

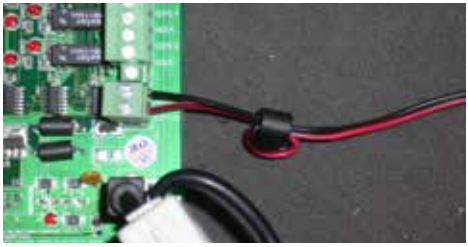
The cores must be mounted as shown in the illustrations, as close as possible on the connectors.

But also the avoidance of errors is very important. Therefore, the careful layout and installation of the wiring is very important!

Folding core on the USB cable to the computer

Folding core on the USB cable to the USB IO
1 or 2 x through the core

Power Supply - TB1



TB1 - External 5V DC		
1	EXT+V	5V+
2	SGND	5V-

More than 5.2V can kill the CPU!

Ferrite sleeve on the power supply cable

The power-supply of our products must be 5V external DC. It is to pay attention to correct polarity. Otherwise, the product could be damaged. If the board is by wrong power supply except function, you can try new store the firmware.

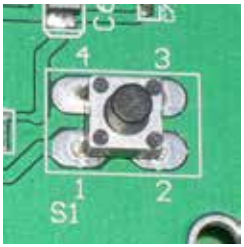
The U-EMI-1 Kit is included with the DIN rail version, and includes ferrite sleeve, shielded by EMI for the power cable. Are shown on the image above.

For earlier versions of the Decision-USB IO was also the possibility of the power supply via the USB bus. To get greater stability, this connection was removed. The USB bus power is not always able to provide enough power for the Relais switched on! The result is a loss of connection or "hanging" USB module. An external power supply provides a secure power supply!

USB Power Management in Windows - In Window System, USB communication might disconnect under Power Saving Mode or Sleep Mode. When connecting USB boards on PC, please make sure windows power management set in case interference with USB communication.

S1 Reset Button

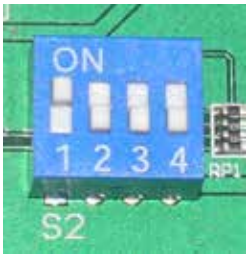
To reset the "hanging" USB-Module



S2 USB ID

Set different ID for each board

1	2	3	4	Card ID
ON	ON	ON	ON	--
OFF	ON	ON	ON	14
ON	OFF	ON	ON	13
OFF	OFF	ON	ON	12
ON	ON	OFF	ON	11
OFF	ON	OFF	ON	10
ON	OFF	OFF	ON	9
OFF	OFF	OFF	ON	8
ON	ON	ON	OFF	7
OFF	ON	ON	OFF	6
ON	OFF	ON	OFF	5
OFF	OFF	ON	OFF	4
ON	ON	OFF	OFF	3
OFF	ON	OFF	OFF	2
ON	OFF	OFF	OFF	1
OFF	OFF	OFF	OFF	0



Multiple Boards Connect

When you need to connect more than 3 boards on one PC, please make sure the following below

1. Set different ID for each board.

2. Supply external 5V to each USB board.

3. Supply external 5V to USB hub.

Please make sure your external 5V power supply enough for the USB I/O boards. If input voltage is below 4.8V for USB I/O board, it can't work normally and sometimes it will cause device manager keeping refreshing itself or can't recognize the device.

TB2/3 ISOLATOR Input Ports

Pin	Signal	Description
1	IN0+	Opto-isolator Ch. 00 + Input
2	IN0-	Opto-isolator Ch. 00 - Input
3	IN1+	Opto-isolator Ch. 01 + Input
4	IN1-	Opto-isolator Ch. 01 - Input
5	IN2+	Opto-isolator Ch. 02 + Input
6	IN2-	Opto-isolator Ch. 02 - Input
7	IN3+	Opto-isolator Ch. 03 + Input
8	IN3-	Opto-isolator Ch. 03 - Input
9	IN4+	Opto-isolator Ch. 04 + Input
10	IN4-	Opto-isolator Ch. 04 - Input
11	IN5+	Opto-isolator Ch. 05 + Input
12	IN5-	Opto-isolator Ch. 05 - Input
13	IN6+	Opto-isolator Ch. 06 + Input
14	IN6-	Opto-isolator Ch. 06 - Input
15	IN7+	Opto-isolator Ch. 07 + Input
16	IN7-	Opto-isolator Ch. 07 - Input

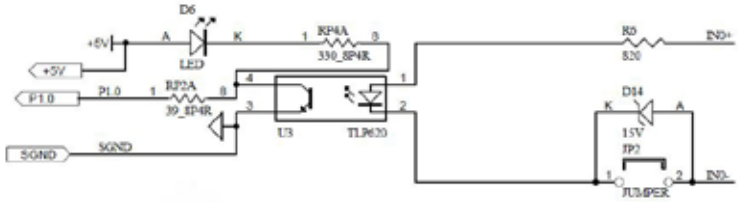
Pin	Signal	Description
1	IN8+	Opto-isolator Ch. 08 + Input
2	IN8-	Opto-isolator Ch. 08 - Input
3	IN9+	Opto-isolator Ch. 09 + Input
4	IN9-	Opto-isolator Ch. 09 - Input
5	IN10+	Opto-isolator Ch. 10 + Input
6	IN10-	Opto-isolator Ch. 10 - Input
7	IN11+	Opto-isolator Ch. 11 + Input
8	IN11-	Opto-isolator Ch. 11 - Input
9	IN12+	Opto-isolator Ch. 12 + Input
10	IN12-	Opto-isolator Ch. 12 - Input
11	IN13+	Opto-isolator Ch. 13 + Input
12	IN13-	Opto-isolator Ch. 13 - Input
13	IN14+	Opto-isolator Ch. 14 + Input
14	IN14-	Opto-isolator Ch. 14 - Input
15	IN15+	Opto-isolator Ch. 15 + Input
16	IN15-	Opto-isolator Ch. 15 - Input

ISOLATOR Input SET JP3 to JP18

The JP3 is used to select voltage signal opto+ and opto- range of photo couple input channel 1, and the JP4 is used to select voltage signal range of photo input channel 2, …etc. When we short the jumper, the input voltage range is 0 to 20V, and open the jumper means input voltage range is 0 to 30V

Jumper	Input Range	Inactive Voltage	Active Voltage
short	0 to 30V	0 to 1.5V	3 to 20V
open	0 to 20V	0 to 16.5V	18 to 30V

Schematic Input Ports



Strong electromagnetic sources, such as power lines, large electric motors, switches, or welders can cause strong electromagnetic interference. Video monitors and cables are strong sources of interference.

If the cable must be led by an area with significant electromagnetic interference, shielded cables with grounding on the source should be used.

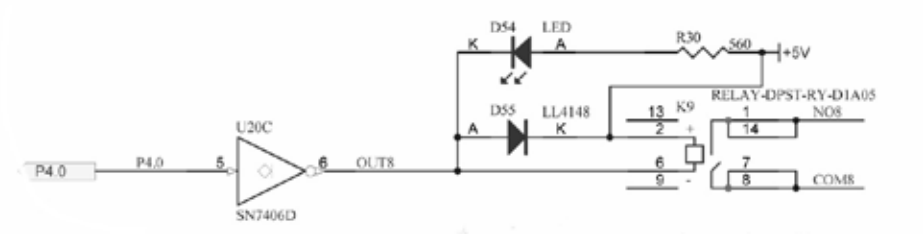
Avoid placing your cable parallel to a high-voltage line! to minimize adverse effects, insert the cable at right angle to the power line.

TB4/5 Relay-Output

Pin	Signal	Description
1	NO 0	Relay Ch. 00 - Output
2	COM 0	Relay Ch. 00 - Output
3	NO 1	Relay Ch. 01 - Output
4	COM 1	Relay Ch. 01 - Output
5	NO 2	Relay Ch. 02 - Output
6	COM 2	Relay Ch. 02 - Output
7	NO 3	Relay Ch. 03 - Output
8	COM 3	Relay Ch. 03 - Output
9	NO 4	Relay Ch. 04 - Output
10	COM 4	Relay Ch. 04 - Output
11	NO 5	Relay Ch. 05 - Output
12	COM 5	Relay Ch. 05 - Output
13	NO 6	Relay Ch. 06 - Output
14	COM 6	Relay Ch. 06 - Output
15	NO 7	Relay Ch. 07 - Output
16	COM 7	Relay Ch. 07 - Output

Pin	Signal	Description
1	NO 8	Relay Ch. 08 - Output
2	COM 8	Relay Ch. 08 - Output
3	NO 9	Relay Ch. 09 - Output
4	COM 9	Relay Ch. 09 - Output
5	NO 10	Relay Ch. 10 - Output
6	COM 10	Relay Ch. 10 - Output
7	NO 11	Relay Ch. 11 - Output
8	COM 11	Relay Ch. 11 - Output
9	NO 12	Relay Ch. 12 - Output
10	COM 12	Relay Ch. 12 - Output
11	NO 13	Relay Ch. 13 - Output
12	COM 13	Relay Ch. 13 - Output
13	NO 14	Relay Ch. 14 - Output
14	COM 14	Relay Ch. 14 - Output
15	NO 15	Relay Ch. 15 - Output
16	COM 15	Relay Ch. 15 - Output

Schematic Outputs



Contact protection circuits

When a reed relay is used with an electromagnetic relay or solenoid, the energy stored will cause an inverse voltage when the reed contacts break. The voltage, although dependent on the inductance value, sometimes reaches as high as several hundred volts and becomes a major factor to deteriorate the contacts.

- DC: Protection circuit with a diode
- DC and AC: Protection circuit with Varistor or RC-element

The suppressor must be made to the load.

Installation

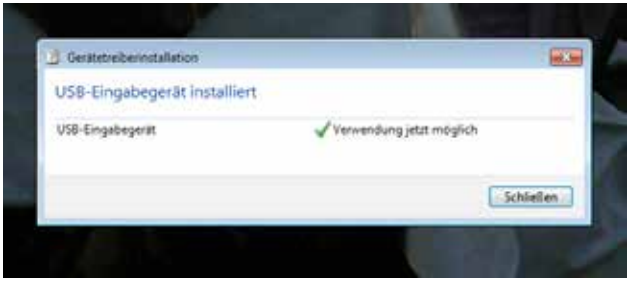
The decision-computer USB devices use the HID (human interface device). The HID belongs to the generic device class is integrated in the operating system. If a new HID device is connected, no driver installation is required. The functions for access and control of HID hid.dll you can find in the Windows System32 folder.

Windows 7 installation example

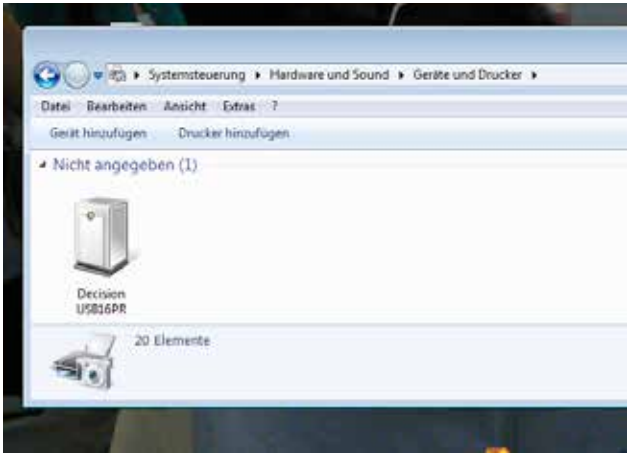
1. Power supply 5V connect

2. USB connect

3. USB input device - device driver software is successfully installed



4. USB input device - use now possible



5. In the Control Panel, you can find the Decision-USB module now

6. Ready to use

SOFTWARE PROGRAMMING UNDER WINDOWS AND LINUX

On Windows, we offer a function library and dll file as programming help. See the manual „USBDII_Manual.pdf“ and demo code in VB/VC / Delphi on the decision-Studio CD.

We offer a C-source Linux users for direct access to the USB devices. See „Dcihid 0.5.1.tgz“ manual and example.

DIAGNOSTICS UNDER WINDOWS/XP

USB test Program.exe is a diagnostic tool to test USB devices on Windows/XP.
The USB test software can be found on the decision-Studio CD.

The examples and drivers be developed continuously. See the latest on the decision-computer-Merz „Service CD“.

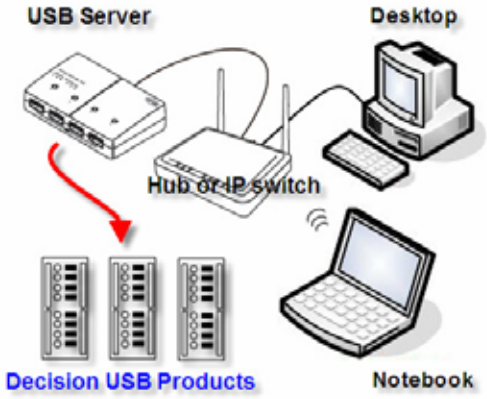
An important way to get more informations you find at http://www.usb-industrial.com

Software support on the short way: http://www.usb-industrial.com/support.html

USB Industrial.com Overview:

Windows Support	2010/04 USBDII.dll 2.0.0.4	This package includes Dynamic-link library which is developed by Decision Computer to communicate with the USB Series Device. It can be included in multiple computer language (VB6, VC6, VB.NET, C# Delphi) under Windows.
Watchdog Timer		This watchdog timer is a kind of software timer that triggers a system reset or other corrective action if the main program, due to some fault condition. The intention is to bring the system back from the unresponsive state into normal operation. This function is new released and please contact us to get further information.
VCP driver	(For LABKIT Only)	Virtual COM port (VCP) drivers cause the USB device to appear as an additional COM port available to the PC. Application software can access the USB device in the same way as it would access a standard COM port. This function is only implemented in USBLABKIT
Linux Support	dcihid - 0.5.1 Basic function library and demo program 2009.05.01	This package includes a c library and a demo program which is developed by Decision Computer to communicate with the USB Series Device under Linux. It also includes a ReadMe file to demonstrate how to use it and package‘s format is .tgz.
Firmware Update	Firmware Hex file Download	This Package includes a driver and a software which is developed by Decision Computer to update the newest firmware into the USB Series Device. When new version of firmware is released, user can follow the instructions to update the firmware.
LabVIEW Support	LabVIEW 8 LabVIEW 2009	This package includes manual and examples which demonstrate how to connect and develop USB Series Device under LabVIEW,which is a well-known platform and development environment for a visual programming language from NI.
ProfiLAB Support		This package includes manual and examples which demonstrate how to connect and develop USB Series Device under ProfiLAB, which is a well-known platform and development environment for a visual programming language from Abacom.
Init Value Setting Tool	(For Output Channel)	The Init Value Setting Tool is a software tool to set init value for output channel. User can use this tool to plan output channel as default high or default low when power on.
Data Acquisition and Remote Monitoring Tool		The Data Acquisition and Remote Monitoring Tool (DARMT) is a software tool to record high/low state reports at local computer, and transmit them to FTP site to achieve data acquisition and remote monitoring

USB by LAN or Wireless



The remote control of Decision USB products by LAN or wireless with a remote-PC is very simple with a multi port USB Server

Because no driver should be installed to the installation and programming is very easy.

Under Windows, are the external USB I/O directly in the Device Manager and can be connect or control such as in the original host PC.

Firmware Update Manual

USBBootloader.exe is the tool software to update firmware into the USB SerialDevice Board developed by Decision Computer. When you get a new version of firmware (.hex), you can follow the steps to update firmware to the board.

1. Remove the external input signal Voltage and only support device power.

2. Set Board Id 15 (All on) for Update Mode and press the Reset button.

3. Connect PC to the Board by USB

4. If this is the first to use this function, please indicate the driver install path to the Driver Folder to install the driver.

5. Open the Software USBBootloader.exe and press the Open button and indicate the hex file and then press the Download button to update firmware.

6. Set Board Id between 0 ~ 14 and press Reset button and connect PC again.

Communication JP1 - only option!

Some unused holes (2 x 5) for JP1 are located on the board. Here a serial port can be added at a special version, with an optional expansion board, RS-232 or RS-422/RS-485. The ports are controlled via the USB. Please contact us if necessary

PC817 Series

High Density Mounting Type Photocoupler

● Lead forming type (I type) and taping reel type (P type) are also available. (PC817I/PC817P)
●● TUV (VDE0884) approved type is also available as an option.

■ Features

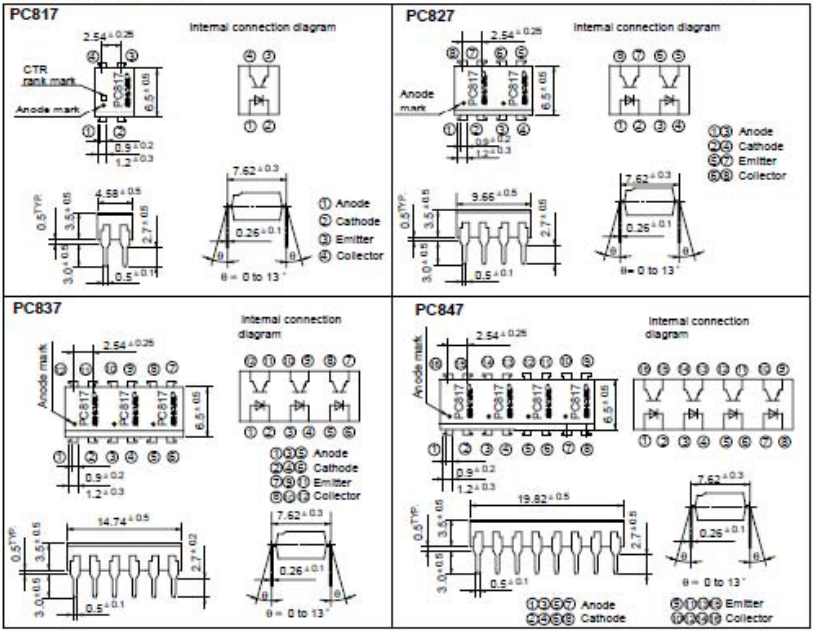
1. Current transfer ratio
   (CTR: MIN. 50% at I_F = 5mA, V_{CE}=5V)
2. High isolation voltage between input and output (V_{iso}: 5 000V$_{rms}$)
3. Compact dual-in-line package
   PC817 : 1-channel type
   PC827 : 2-channel type
   PC837 : 3-channel type
   PC847 : 4-channel type
4. Recognized by UL, file No. E64380

■ Applications

1. Computer terminals
2. System appliances, measuring instruments
3. Registers, copiers, automatic vending machines
4. Electric home appliances, such as fan heaters, etc.
5. Signal transmission between circuits of different potentials and impedances

■ Outline Dimensions

(Unit : mm)



" In the absence of confirmation by device specification sheets, SHARP takes no responsibility for any defects that occur in equipment using any of SHARP's devices, shown in catalogs, data books, etc. Contact SHARP in order to obtain the latest version of the device specification sheets before using any SHARP's device."

FEATURES

- 1 Form A Contact
- DIP Terminal
- Application for Fax Modem, Telecommunication, Security Alarm System
- UL File No. E147052

COIL RATING (at 20 °C)

Nominal Voltage (VDC)	Coil Resistance (Ω±10%)	Nominal Current (mA)	Pick-Up Voltage (VDC)	Drop-Out Voltage (VDC)	Maximum Allowable Voltage (VDC)	Power Consumption (mW)
5	500	10.0	3.75	0.6	15	50
12	1000	12.0	9.0	1.44	30	144
24	2150	11.2	18.0	2.88	44	268

SPECIFICATIONS

Contact Arrangement		1 Form A
Contact Material		Ru / Rh
Contact Resistance		Max. 150mΩ (initial)
Contact Rating (at Resistive Load)	**Max. Switching Voltage**	100VDC
	Max. Switching Current	0.5A
	Max. Switching Power	10W (DC) / 10VA (AC)
	Max. Carrying Current	1A
Dielectric Strength		
Between Coil & Contact		1400 VDC (1 minute)
Between Contacts		250VDC (1 minute)
Operate Time		Max. 1.0m Sec.
Release Time		Max. 0.5m Sec.
Ambient Temperature		-40 °C~+85 °C
Insulation Resistance		Min. 100MΩ at 500VDC
Vibration Resistance		1.5mm D.A. 10-55HZ
Shock	**Functional**	20G
	Destruction	100G
Mechanical Life		1 x 10^8 operations (at no load)
Electrical Life		1 x 10^6 operations (at rated load)
Weight		Approx. 2g

A.1 Copyright

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A.2 Warranty Information

SmartLab warrants that for a period of one year from the date of purchase (unless otherwise specified in the warranty card) that the goods supplied will perform according to the specifications defined in the user manual. Furthermore that the SmartLab product will be supplied free from defects in materials and workmanship and be fully functional under normal usage.

In the event of the failure of a SmartLab product within the specified warranty period, SmartLab will, at its option, replace or repair the item at no additional charge. This limited warranty does not cover damage resulting from incorrect use, electrical interference, accident, or modification of the product.

All goods returned for warranty repair must have the serial number intact. Goods without serial numbers attached will not be covered by the warranty.

The purchaser must pay transportation costs for goods returned. Repaired goods will be dispatched at the expense of SmartLab.

To ensure that your SmartLab product is covered by the warranty provisions, it is necessary that you return the Warranty card.

Under this Limited Warranty, SmartLab's obligations will be limited to repair or replacement only, of goods found to be defective a specified above during the warranty period. SmartLab is not liable to the purchaser for any damages or losses of any kind, through the use of, or inability to use, the SmartLab product.

SmartLab reserves the right to determine what constitutes warranty repair or replacement.

Return Authorization: It is necessary that any returned goods are clearly marked with an RA number that has been issued by SmartLab. Goods returned without this authorization will not be attended to.